9 March 2015
Project No. 9101110001

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Subject: Responses to ADEQ Comments provided 24 February 2015
Former Williams Air Force Base
Mesa, Arizona

The Air Force has prepared responses and the attached PowerPoint presentation slides to address ADEQ comments provided by email on 24 February 2015. The presence of LNAPL in W37 has historically been observed prior to, during, and following previous groundwater extraction events (containment study in 2011-14), and is the result of hydraulic pressure response in the subsurface which mobilizes LNAPL that was already in the vicinity of this well. Specific responses to the comments are provided below.

ADEQ Unit Management is disheartened to hear LNAPL reported east of Sossaman Road (well 37) via multiple monitoring periods. Management not convinced contaminant contained. Management questions whether sentinel wells exist to show LNAPL extent.

Management has directed staff to emphasize lack of confidence in ST012 containment.

Response: Using system operation and monitoring approaches established in the Remedial Design and Remedial Action Work Plan (RD/RAWP), hydraulic containment of ST012 dissolved and LNAPL contamination has been maintained. As demonstrated in weekly operations reports, net surplus extraction has maintained hydraulic containment of the site area. Hydraulic and contaminant containment is monitored and confirmed via manual and automated groundwater elevation measurements, manual and automated temperature measurements, manual LNAPL measurements, and dissolved benzene monitoring. LNAPL has been noted in reports to be present in ST012-W37 for several years and the presence of LNAPL at the well during Steam-Enhanced Extraction (SEE) operations is not attributed to migration from the ST012 thermal treatment zones (TTZs). LNAPL presence east of Sossaman Road was identified in the RD/RAWP (figure provided in attached presentation file - slide 1) and the planned response for this area is Enhanced Bioremediation (EBR) as documented in the RD/RAWP. The observed increases in LNAPL in this well during SEE operations are in response to hydraulic changes in the area that allow LNAPL already in the vicinity to accumulate in the well, similar to observations during the operation of the ST012 containment system before SEE operations commenced. We have also seen similar responses in ST012-W11 recently at a smaller scale (located on the southwestern perimeter of the TTZ, also an area designated by the RD/RAWP to be addressed by EBR).

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Specific Management Questions:

1. ***How (what trigger event) occurred to allow LNAPL to migrate east of Sossaman Road?***

Response: LNAPL is likely present as a result of historic release during active base operations when groundwater elevations were coincident with the Lower Saturated Zone (LSZ) where ST012-W37 is screened (210-245 ft bgs) (historic low groundwater depth of 232 ft bgs noted in the ST012 Focused Feasibility Study Conceptual Site Model). LNAPL has been observed periodically east of Sossaman for several years and historic benzene concentrations reported east of Sossaman Road have indicated the likely presence of LNAPL since the 1992 Operable Unit 2 Remedial Investigation. ST012-W37 was installed in December 2009 and has had measurable LNAPL since 2011. The presence of LNAPL in this well has been observed in association with hydraulic pressure gradients during containment system pumping and shut down (2011-early 2014) (see attached presentation file - slides 2 and 3). The LNAPL accumulations in ST012-W37 can be attributed to similar hydraulic pressure gradients occurring during pumping and periodic shutdowns associated with the more robust SEE system. Additionally, steam injection at SIW-LSZ26 has been temporarily suspended to address maintenance at nearby steam extraction wells, during which time any related effects of LNAPL accumulation at ST012-W37 are being monitored.

2. ***When did the LNAPL cross Sossaman Road?***

Response: It is not known when the LNAPL crossed Sossaman Road but it is clear that the migration happened historically, likely before any of the historical remediation activities at the site. See the discussion provided with the response to comment 1.

3. ***What time interval accounts for LNAPL migration?***

Response: As indicated in the previous response, the LNAPL migration likely occurred many years if not decades ago. The presence of LNAPL in the LSZ interval where ST012-W37 is screened may be associated with active releases that occurred during historically low groundwater elevations (up to 232 ft bgs, 1980's) and lateral spreading that may have occurred during the historic releases (pre-1991) and rise of groundwater through the LSZ (1990's).

4. ***Is LNAPL migration ongoing?***

Response: LNAPL is migrating locally within the containment area due to the changes in hydraulic pressures and gradients caused as a result of the active remediation in the area. However, the migration is toward the site due to the net extraction from the site and inward gradients. The attached graphic on slide 4 illustrates the measured gradients between ST012-W24 and ST012-W37 during the SEE operation period. Based on the monitoring data, further LNAPL migration downgradient is not occurring. Upgradient well ST012-W11 is located just southwest of the SEE TTZ. ST012-W11 has also historically had LNAPL and has shown recent increases in LNAPL levels illustrating the effect of hydraulic pressures in a well located upgradient of the SEE TTZ. Groundwater elevation and temperature data for ST012-W37 provided in the weekly reports supports that there is no indication of heating at W37 from the SEE project.

5. Will LNAPL impact area further east?

Response: Based on gradients toward the site, LNAPL will not migrate to areas farther east than where it is currently located. As LNAPL is mobilized by hydraulic pressure gradients it is possible that some localized increases in dissolved phase concentrations may also be seen within the contained area due to increased mixing. However, the historical plume record demonstrates a capacity of the aquifer to attenuate benzene to the east of the site and EBR will be implemented in the area after SEE. Perimeter monitoring results at downgradient well ST012-W24 have not indicated increases in benzene or TPH based on monthly sampling conducted in accordance with Table 5-1 of the RD/RAWP through the January 2015 results.

6. Will LNAPL quantity increase as a result of SEE operations?

Response: The quantity of LNAPL that is outside of the TTZ will decrease. LNAPL is actively being removed from ST012-W37 by periodic pumping and from ST012-W11 by periodic bailing. In addition, net extraction from the site is positive and perimeter water levels indicate inward gradients that pull water and mobile LNAPL toward the TTZ. The remedy includes EBR to address any residual LNAPL that may remain outside the TTZ following SEE treatment at the site.

7. Responsible party to provide proof/defensible data to show issue understanding and handling.

Response: See previous responses.

Please contact me at (602) 733-6040 or Catherine Jerrard at (315) 356-0810, ext. 204 or catherine.jerrard@us.af.mil, if you have any questions regarding these responses.

Sincerely,
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Attachments:
A – ST012 ADEQ Containment Comments PowerPoint Presentation

ATTACHMENT A

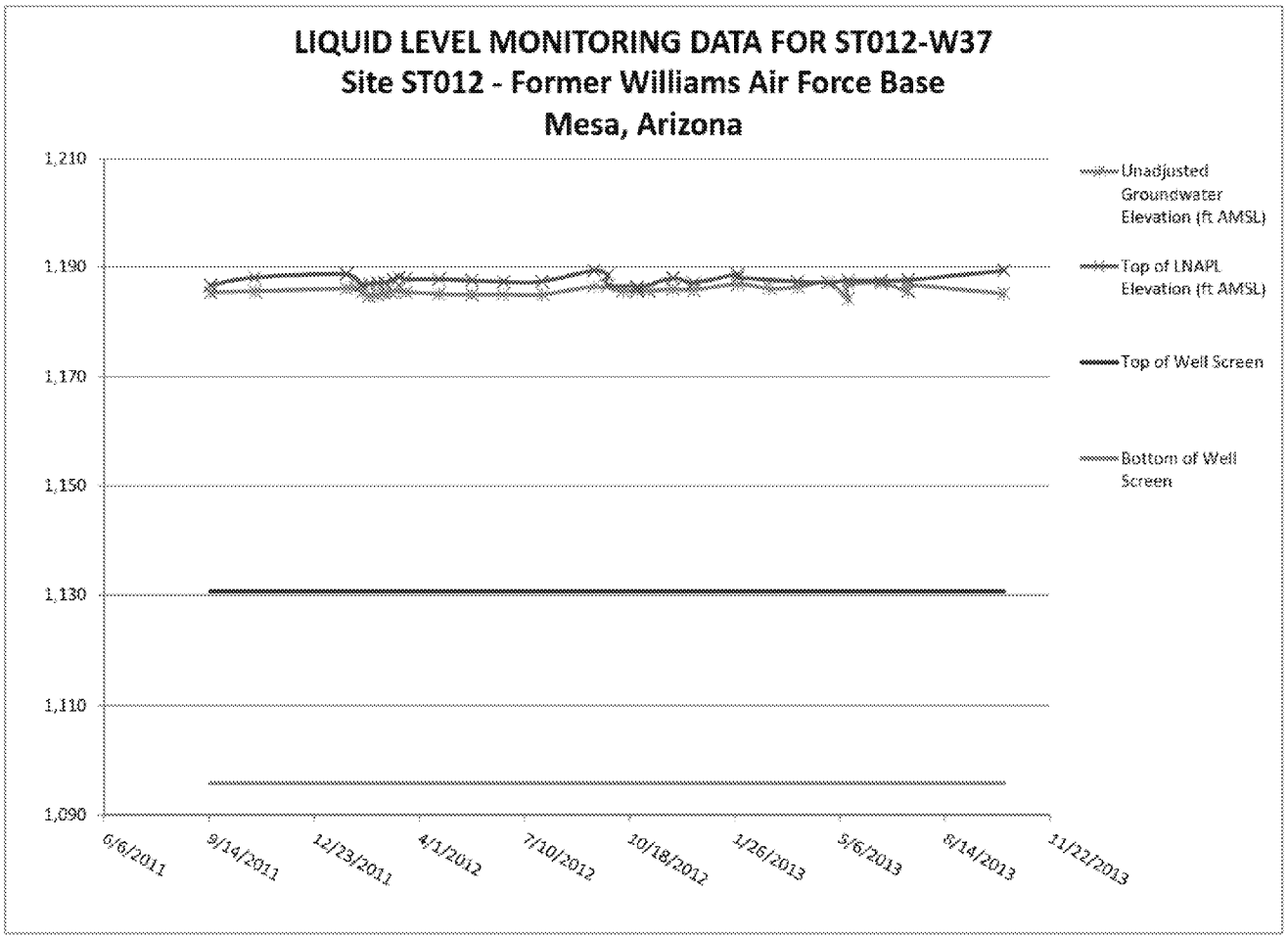
ST012 ADEQ CONTAINMENT COMMENTS POWERPOINT PRESENTATION

ST012 ADEQ CONTAINMENT COMMENTS

POSSIBLE LNAPL PRESENCE ACROSS SOSSAMAN IN THE LSZ IDENTIFIED IN THE RD/RAWP (Figure 3-2)

ST012 ADEQ CONTAINMENT COMMENTS

LNAPL OBSERVATIONS DURING CONTAINMENT STUDY



ST012 ADEQ CONTAINMENT COMMENTS

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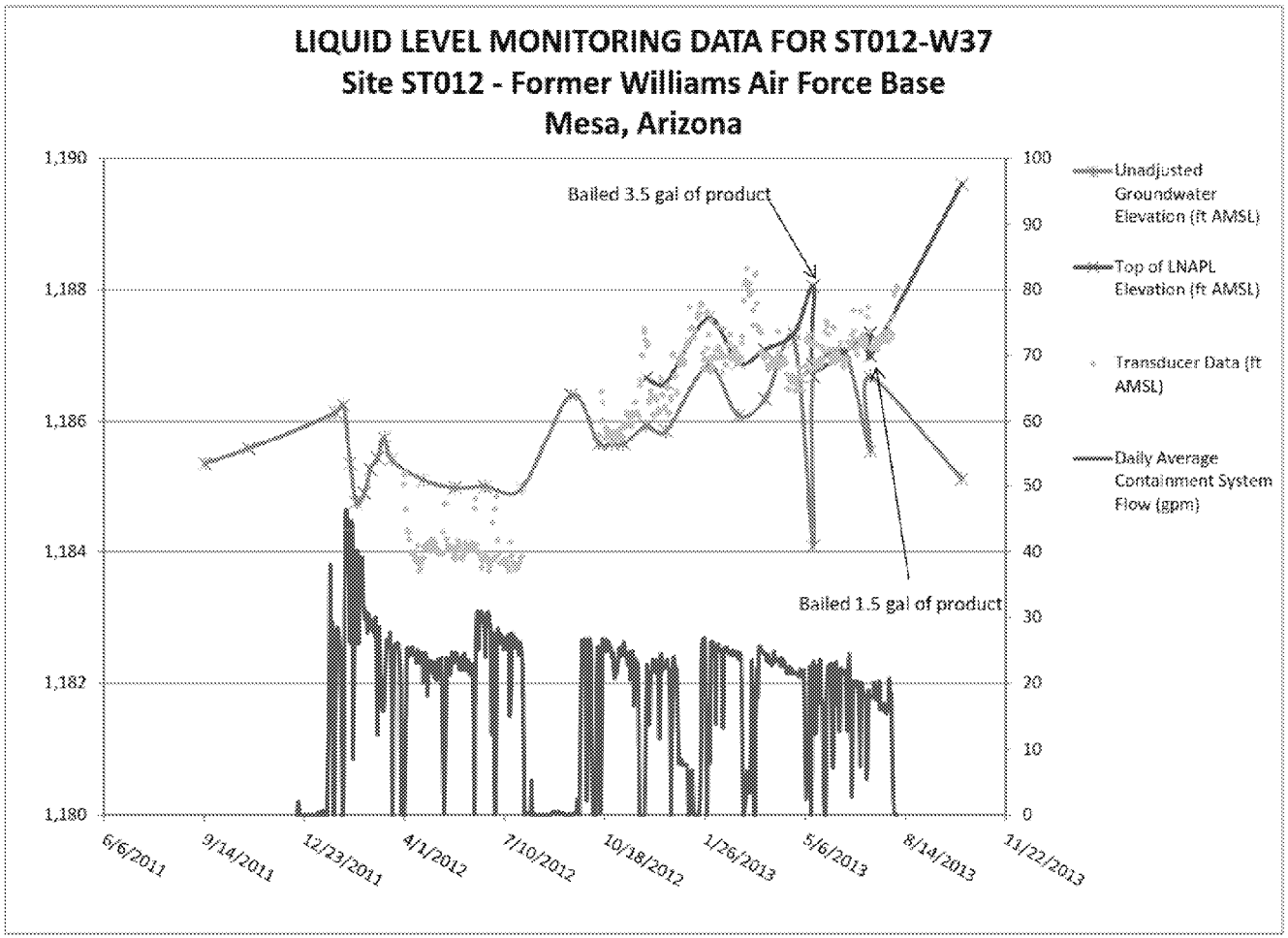

ST012 ADEQ CONTAINMENT COMMENTS

HISTORICAL GRADIENT BETWEEN W37 AND W24

(W37 MEASUREMENTS TYPICALLY AFTER LNAPL REMOVAL)

	W37-W24
9/24/2014	0.24
9/29/2014	0.11
10/6/2014	0.20
10/10/2014	-0.87
10/13/2014	-0.22
10/20/2014	-0.92
10/27/2014	-0.35
10/31/2014	-1.08
11/3/2014	-1.14
11/10/2014	-0.68
11/17/2014	-0.41
11/24/2014	-0.46
12/1/2014	-0.23
12/8/2014	-0.78
12/12/2014	-1.11
12/19/2014	-0.21
12/23/2014	-0.51
12/26/2014	-0.94
1/2/2015	-0.48
1/13/2015	-1.09
1/16/2015	-0.83
1/23/2015	0.22
1/30/2015	4.37
2/9/205	-0.66
2/20/2015	-1.58